

Appl. No. 10/001,671  
Amdt. dated Nov. 17 2003  
Reply to Office action of Sep. 17, 2003

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

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Claim 1 (Currently Amended): A chain sprocket for roller chain drives, said sprocket having a sprocket center and teeth spaced by seatings for chain rollers, at least some sprocket teeth have flank profiles differing from one another and disposed in an arrangement effective to reduce noise generated by meshing of the chain rollers with the sprocket, the flank profiles selected to maintain a constant spacing between the seatings of the chain rollers and the sprocket center.

Claims 2-9 (Previously Canceled).

Claim 10 (Currently Amended): A ~~sprocket for a~~ roller or bushing chain and sprocket system, the ~~sprocket system~~ comprising:

a roller or bushing chain having links connected by rollers or bushings;

a plurality of teeth disposed about the circumference of the sprocket having roots defined between adjacent teeth for receiving the rollers or bushings, the sprocket teeth each having a flank profile; and

at least a first flank profile and at least a second flank profile, the second flank profile being different from the first flank profile, the first and second flank profiles arranged in a pattern effective to reduce noise generated by contact between the rollers or bushings of the chain and the sprocket.

Claim 11 (Currently Amended): A ~~sprocket for a~~ roller or bushing chain and sprocket system according to claim 10, wherein the roots each having have a root radius  $r_1$  are defined between adjacent teeth for receiving rollers of a chain, the roots having and a constant root diameter  $d_1$ .

Appl. No. 10/001,671  
Amdt. dated Nov. 17 2003  
Reply to Office action of Sep. 17, 2003

Claim 12 (Currently Amended): A sprocket for a roller or bushing chain and sprocket system according to claim 11, wherein the first flank profile is defined by a tooth flank radius  $r_{e1}$ , the tooth flank radius  $r_{e1}$  varying between a maximum tooth flank radius  $r_{e1 \text{ max}}$  and a minimum tooth flank radius  $r_{e1 \text{ min}}$ , and the second flank profile is defined by a tooth flank radius  $r_{e2}$  different from the tooth flank radius  $r_{e1}$ , the tooth flank radius  $r_{e2}$  varying between a maximum tooth flank radius  $r_{e2 \text{ max}}$  and a minimum tooth flank radius  $r_{e2 \text{ min}}$ .

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Claim 13 (Currently Amended): A sprocket for a roller or bushing chain and sprocket system according to claim 12, wherein the flank profiles between each pair of adjacent teeth have an angle  $\alpha$  between the root radius  $r_1$  and the tooth flank radius, the angle  $\alpha$  varying according to the adjacent flank profiles effective to maintain tangency between each tooth flank radius and root radius  $r_1$ .

Claim 14 (Currently Amended): A sprocket for a roller or bushing chain and sprocket system according to claim 12, wherein the sprocket comprises teeth having at least a third flank profile, the third flank profile being different from the first and second flank profiles, the first, second, and third flank profiles arranged in a pattern effective to reduce noise generated by contact between the chain and the sprocket.

Claim 15 (Currently Amended): A sprocket for a roller or bushing chain and sprocket system according to claim 14, wherein the third flank profile is defined by a tooth flank radius  $r_{e3}$  different from the tooth flank radius  $r_{e1}$  and the tooth flank radius  $r_{e2}$ , the tooth flank radius  $r_{e3}$  varying between a maximum tooth flank radius  $r_{e3 \text{ max}}$  and a minimum tooth flank radius  $r_{e3 \text{ min}}$ .

Claim 16 (Currently Amended): A sprocket for a roller or bushing chain and sprocket system according to claim 10, wherein the first and second flank profiles are selected so that the sprocket engages the chain at a different pressure angle for teeth having the first flank profile than for teeth having the second flank profile.

Appl. No. 10/001,671  
Amdt. dated Nov. 17 2003  
Reply to Office action of Sep. 17, 2003

Claim 17 (Currently Amended): A ~~sprocket for a~~ roller or bushing chain and sprocket system according to claim 10, wherein the sprocket has a constant outer diameter  $d_o$ .

Claim 18 (Currently Amended): A ~~sprocket for a~~ roller or bushing chain and sprocket system according to claim 10, wherein the first and second flank profiles are selected to maintain a constant chordal pitch between adjacent teeth.

Claim 19 (Currently Amended): A ~~sprocket for a~~ roller or bushing chain and sprocket system according to claim 10, wherein each tooth has a first side and a second side, the first and second sides for each respective tooth having an identical tooth flank radius  $r_{en}$ .

Claim 20 (Currently Amended): A method of ~~making a sprocket for~~ providing a roller or bushing chain and sprocket system, the method comprising:

providing a roller or bushing chain having a plurality of links connected by rollers or bushings;

defining a plurality of teeth disposed about the circumference of the sprocket having roots between adjacent teeth for receiving the rollers or bushings of the chain, the sprocket teeth each having a flank profile;

providing at least a first flank profile and at least a second flank profile, the second flank profile being different from the first flank profile; and

arranging the first and second flank profiles in a pattern effective to reduce noise generated by contact between the rollers or bushings of the chain and the sprocket.

Claim 21 (Currently Amended): A method of ~~making~~ providing a ~~sprocket system~~ according to claim 20, including providing ~~roots between adjacent teeth for receiving rollers of a chain~~, each root with having a radius  $r_i$  and the roots having with a constant root diameter  $d_i$ .

Claim 22 (Currently Amended): A method of ~~making~~ providing a ~~sprocket system~~ according to claim 21, including defining the first flank profile by a tooth flank radius  $r_{e1}$ , the

Appl. No. 10/001,671  
Amdt. dated Nov. 17 2003  
Reply to Office action of Sep. 17, 2003

tooth flank radius  $r_{e1}$  varying between a maximum tooth flank radius  $r_{e1} \text{ max}$  and a minimum tooth flank radius  $r_{e1} \text{ min}$ , and defining the second flank profile a tooth flank radius  $r_{e2}$  different from the tooth flank radius  $r_{e1}$ , the tooth flank radius  $r_{e2}$  varying between a maximum tooth flank radius  $r_{e2} \text{ max}$  and a minimum tooth flank radius  $r_{e2} \text{ min}$ .

Claim 23 (Previously Added): A method of making providing a sprocket system according to claim 22, including providing the flank profiles between each pair of adjacent teeth with an angle  $\alpha$  between the root radius  $r_1$  and the tooth flank radius and varying the angle  $\alpha$  according to the adjacent flank profiles effective to maintain tangency between each tooth flank radius and root radius  $r_1$ .

Claim 24 (Previously Added): A method of making providing a sprocket system according to claim 22, including providing the sprocket with teeth having at least a third flank profile, the third flank profile being different from the first and second flank profiles, the first, second, and third flank profiles arranged in a pattern effective to reduce noise generated by contact between the rollers or bushings of the chain and the sprocket.

Claim 25 (Currently Amended): A method of making providing a sprocket system according to claim 24, including defining the third flank profile by a tooth flank radius  $r_{e3}$  different from the tooth flank radius  $r_{e1}$  and the tooth flank radius  $r_{e2}$ , the tooth flank radius  $r_{e3}$  varying between a maximum tooth flank radius  $r_{e3} \text{ max}$  and a minimum tooth flank radius  $r_{e3} \text{ min}$ .

Claim 26 (Previously Added): A method of making providing a sprocket system according to claim 20, including selecting the first and second flank profiles so that the sprocket engages the chain at a different pressure angle for teeth having the first flank profile than for teeth having the second flank profile.

Appl. No. 10/001,671  
Amdt. dated Nov. 17 2003  
Reply to Office action of Sep. 17, 2003

Claim 27 (Previously Added): A method of making providing a sprocket system according to claim 20, including configuring the sprocket to have a constant outer diameter  $d_a$ .

Claim 28 (Previously Added): A method of making providing a sprocket system according to claim 20, including selecting the first and second flank profiles to maintain a constant chordal pitch between adjacent teeth.

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Claim 29 (Previously Added): A method of making providing a sprocket system according to claim 20, including providing each tooth with a first side and a second side and configuring the flank profile for each respective tooth to have an identical tooth flank radius  $r_s$  on the first side and the second side.

Claim 30 (Currently Amended): A ~~sprocket for a roller or bushing chain and sprocket system~~, the sprocket system comprising:

a roller or bushing chain having links connected by rollers or bushings;

a plurality of teeth disposed about the circumference of the sprocket, the sprocket teeth each having a flank profile;

at least a first flank profile and at least a second flank profile, the second flank profile being different from the first flank profile; and

means for arranging the first and second flank profiles to reduce noise generated by contact between the rollers or bushings of the chain and the sprocket.

Claim 31 (Currently Amended): A ~~sprocket for a roller or bushing chain and sprocket system~~, the sprocket system comprising:

a roller or bushing chain having links connected by rollers or bushings;

a plurality of teeth disposed about the circumference of the sprocket, the sprocket teeth each having a flank profile; and

at least a first flank profile, at least a second flank profile, and at least a third flank profile, the first flank profile being different from the second and third flank profiles and the

Appl. No. 10/001,671  
Amdt. dated Nov. 17 2003  
Reply to Office action of Sep. 17, 2003

second flank profile being different from the third flank profile, the first, second, and third flank profiles arranged in a pattern effective to reduce noise generated by contact between the rollers or bushings of the chain and the sprocket.

Claim 32 (Currently Amended): A ~~sprocket for a roller chain and sprocket system,~~  
the ~~sprocket system~~ comprising:

a roller or bushing chain having links connected by rollers or bushings;

a plurality of teeth disposed about the circumference of the sprocket, the sprocket teeth each having a flank profile with a tooth flank radius  $r_o$ , each tooth having first and second sides having an identical tooth flank radius  $r_o$ ;

roots defined between pairs of adjacent teeth for receiving rollers or bushings of the roller chain, each root having a root radius  $r_i$ ; and

a plurality of different flank profiles each having a different tooth flank radius  $r_{en}$ , the teeth flank radii varying between a maximum tooth flank radius  $r_o \text{ max}$  and a minimum tooth flank radius  $r_o \text{ min}$ , the different flank profiles arranged in a pattern effective to reduce noise generated by contact between the roller chain and the sprocket by varying the pressure angle at which the ~~roller~~ rollers or bushings of the chain contacts the roots while maintaining a constant root diameter  $d_i$  and a constant addendum circle diameter  $d_a$ .

Claim 33 (New): A chain sprocket and roller chain drive system, said chain having a plurality of links connected by rollers and said sprocket having a sprocket center and teeth spaced by seatings for chain rollers, at least some sprocket teeth have flank profiles differing from one another and disposed in an arrangement effective to reduce noise generated by meshing of the chain rollers with the sprocket, the flank profiles selected to maintain a constant spacing between the chain rollers and the sprocket center when the chain rollers are in the seatings.